WELCOME TO

LILYDALE REGIONAL PARK

The "Brickyard" Area

Introduction

Lilydale Regional Park is a park in the river flat area of the south central part of Saint Paul. It is the only Saint Paul park that extends into Dakota County. The area known as the "brickyard" is the only part of Lilydale Park where a special use permit is required for access. The remainder of the park is open for use by the public without a permit. Keep in mind, however, that Lilydale is still an undeveloped park, and there are no facilities of any kind in the park.

This brochure is divided into two sections to reflect the two main attractions of the Brickyard Area, Fossil Hunting and Echo Cave.

CONDITIONS OF SPECIAL USE PERMIT

Your Special Use permit does not allow the bearer to use the site in an indiscriminate matter.

The following uses are considered not appropriate:

Commercial collecting

Unusual alteration or abuse of resources
(for example: overzealous use of hammer and chisel)

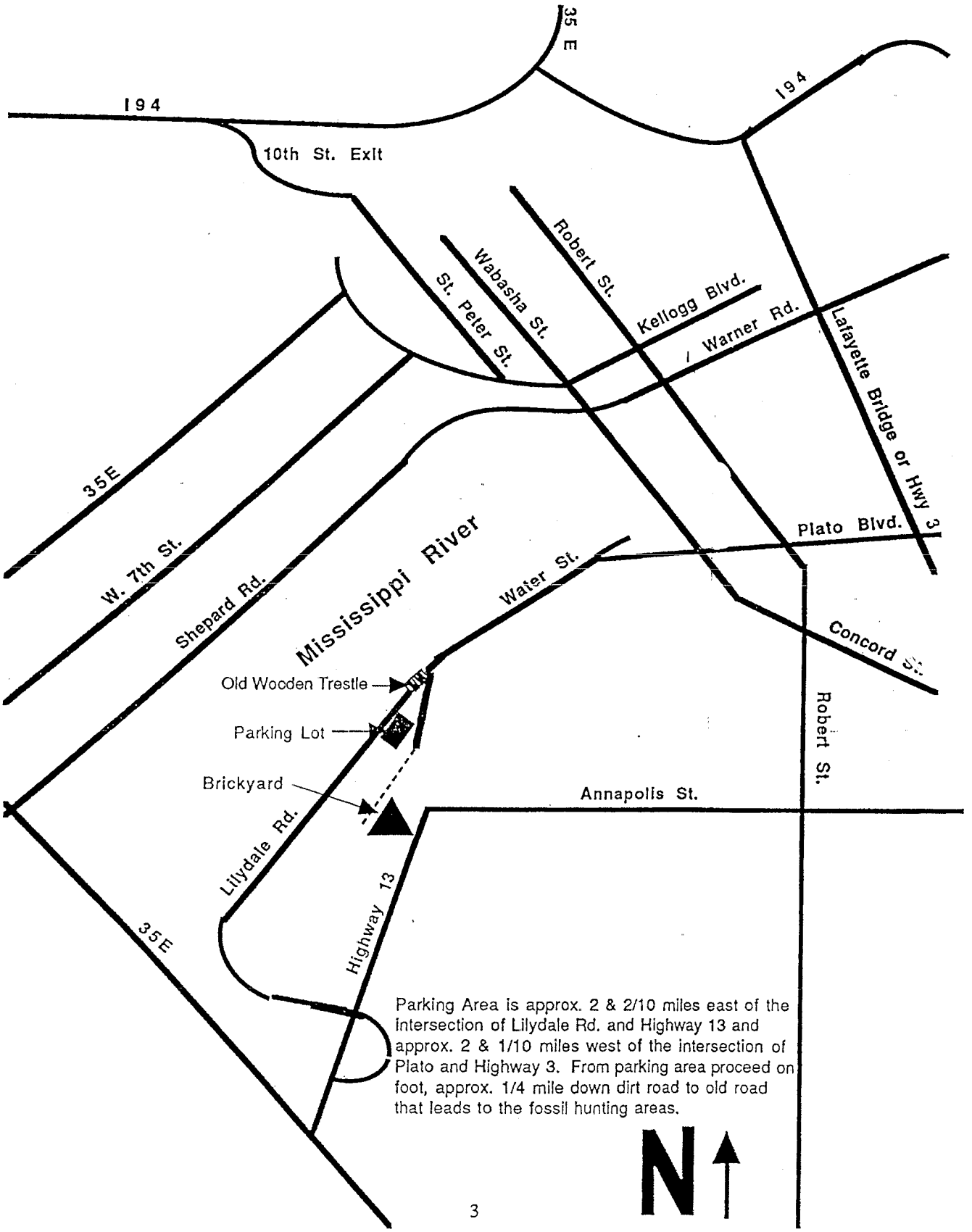
Mechanical extraction methods
(employing hydraulic, electrical or air power)

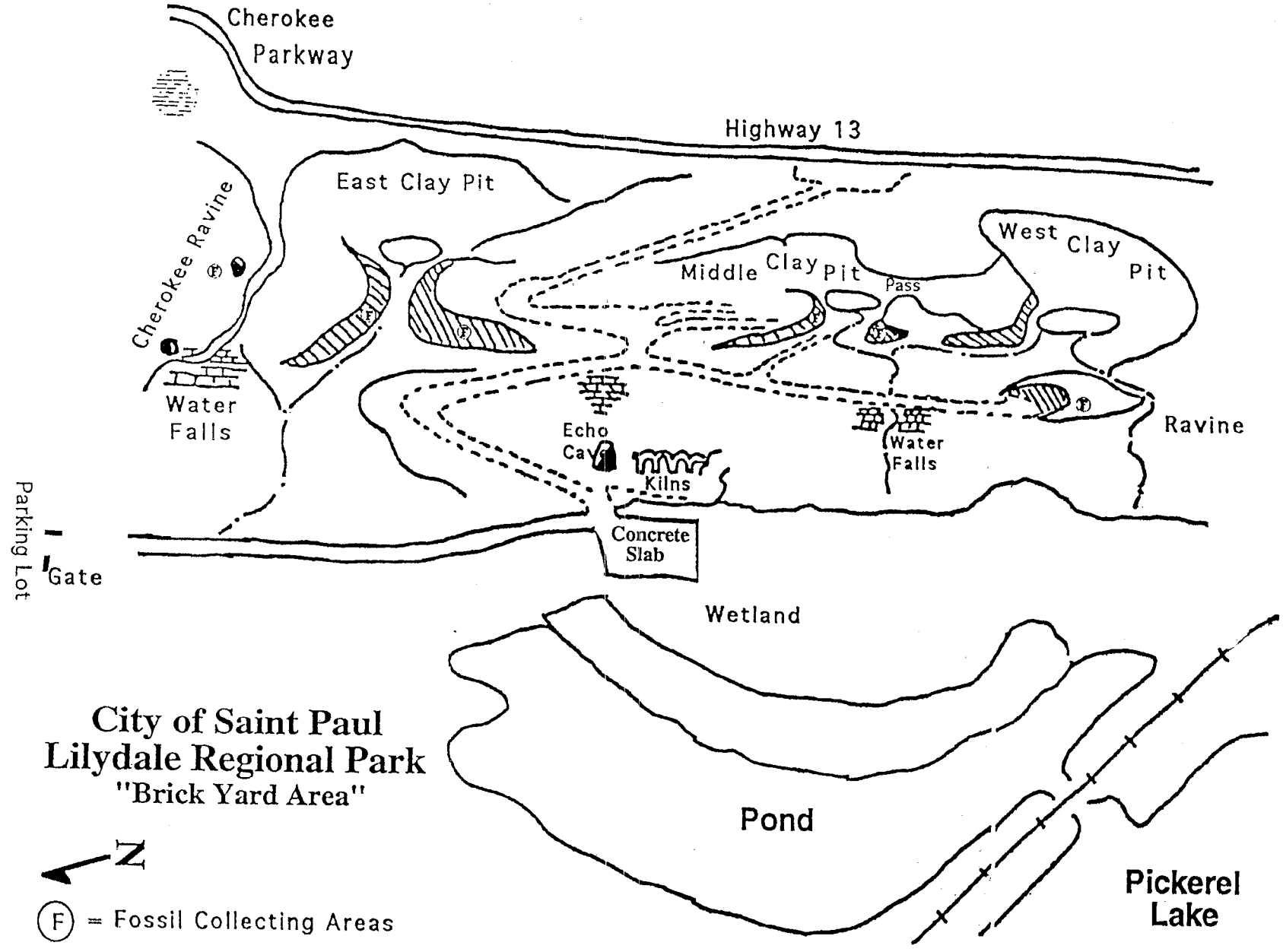
Retention of known or suspect material of scientific value or unusual quality

The permit may be revoked at the discretion of the Park Director or its authorized agent at any time during the use of this City of Saint Paul facility.

ENJOY YOUR VISIT TO LILYDALE REGIONAL PARK!

Lilydale Regional Park
Access Routes




Cherokee Parkway
Highway 13
East Clay Pit
Cherokee Ravine
Middle Clay Pit
Pass
West Clay Pit
Water Falls
Echo Cave
Kilns
Water Falls
Ravine
Concrete Slab
Parking Lot
Gate
Wetland
Pond
Pickerel Lake
City of Saint Paul
Lilydale Regional Park
"Brick Yard Area"
N
(F) = Fossil Collecting Areas

WHAT ARE FOSSILS?

Fossils are the preserved remains or traces of plants or animals. The conditions needed to preserve fossils occur very rarely in nature, so the fossil record is only a tiny fraction of the history of all living organisms.

The word fossil comes from a Latin word meaning "to dig up". Fossils have not always been recognized as the remains of once living organisms. Not understanding mountain building or plate tectonics, early civilizations have struggled with the mystery of sea shells stranded on mountain tops and in barren deserts.

In 450 B.C. Herodotus, a Greek historian, realized that an ocean had at one time covered what was then an Egyptian desert. A change in sea level had exposed the graveyard of ancient sea creatures. But could the ocean have been so deep as to have left shells sitting on a mountain peak?

One hundred years later a student of Aristotle named Theophrastus thought that the fossils had originated from eggs or seeds that had been "planted" in the mountain rocks. Almost two thousand years ago, Strabo speculated that it was the "rocks" themselves that had risen . . . carrying the bodies of aquatic animals with them. During the Dark Ages, fossils were explained as tricks of the devil to fool man; or evidence of imperfections, discarded by God during the Creation. Strict Biblical interpretation allowed that the bones of animals found in the ground were mute testimony to the devastation of the Great Flood. Leonardo da Vinci (1452-1519) realized that fossils were indeed the remains of once living animals.

Trace fossils, or ichnofossils, include such things as footprints and trails. Burrows or borings made by animals such as worms, trilobites, and bivalves can also be preserved if they are filled with sediment and hardened into rock.

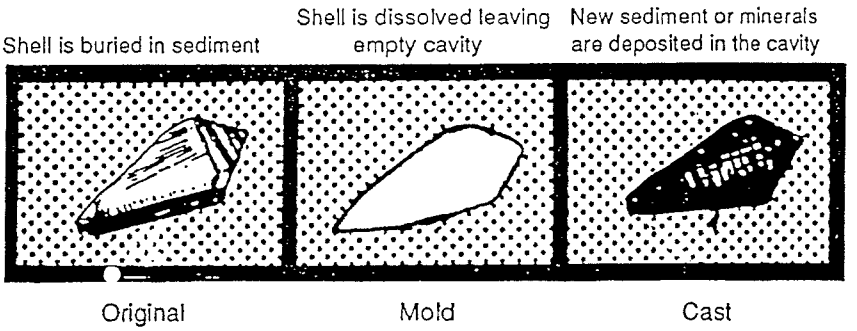
The word petrified comes from a Greek word "petros" meaning stone. A common misconception is that all fossils have been "turned to stone". To become fossilized; bones, wood, teeth, or shells need to be covered quickly by sediment, thus preventing decay and attack by scavengers. Some of these hard parts are so stable that they remain as they were originally. These would include the shells of some marine animals. Most fossils however, have undergone some kind of chemical change from the original material.

Petrification or petrifaction can be accomplished in three ways:

Permineralization: After a bone is buried, groundwater deposits minerals in the spongy areas of the bone. Porous shells are also mineralized in this way. This process, called permineralization, results in the fossil material weighing more than the original matter. Sometimes the crystal structure is changed by recrystallization. This process may alter the appearance of the original material.

Replacement: Petrification is also accomplished by a process called replacement in which the original material is dissolved, molecule by molecule, and another material is deposited in its place. Petrified wood is a good example of this.

Pseudomorphs or Casts: When an organism is covered with sediment, which later turns to rock, and the organism is dissolved away, the shape or opening left in the rock is called a mold. If the opening in the rock is later filled in with new minerals, this copy of the original organism is called a cast or pseudomorph.



MINNESOTA'S FOSSILS

450 million years ago, much of Minnesota was under 100-150 feet of salt water. The life contained in this ancient ocean resembled a tropical offshore environment consisting of corals, bryozoans, clams, snails, and the familiar sea shells or brachiopods. These animals are little changed and therefore easily recognized. Some animals, however, are exotic in that they are now mostly extinct. The cephalopods or hard-shelled squid-like mollusks and trilobites, ancestors of all arthropods (insects and crabs), are strange in appearance and also lived in this ancient ocean.

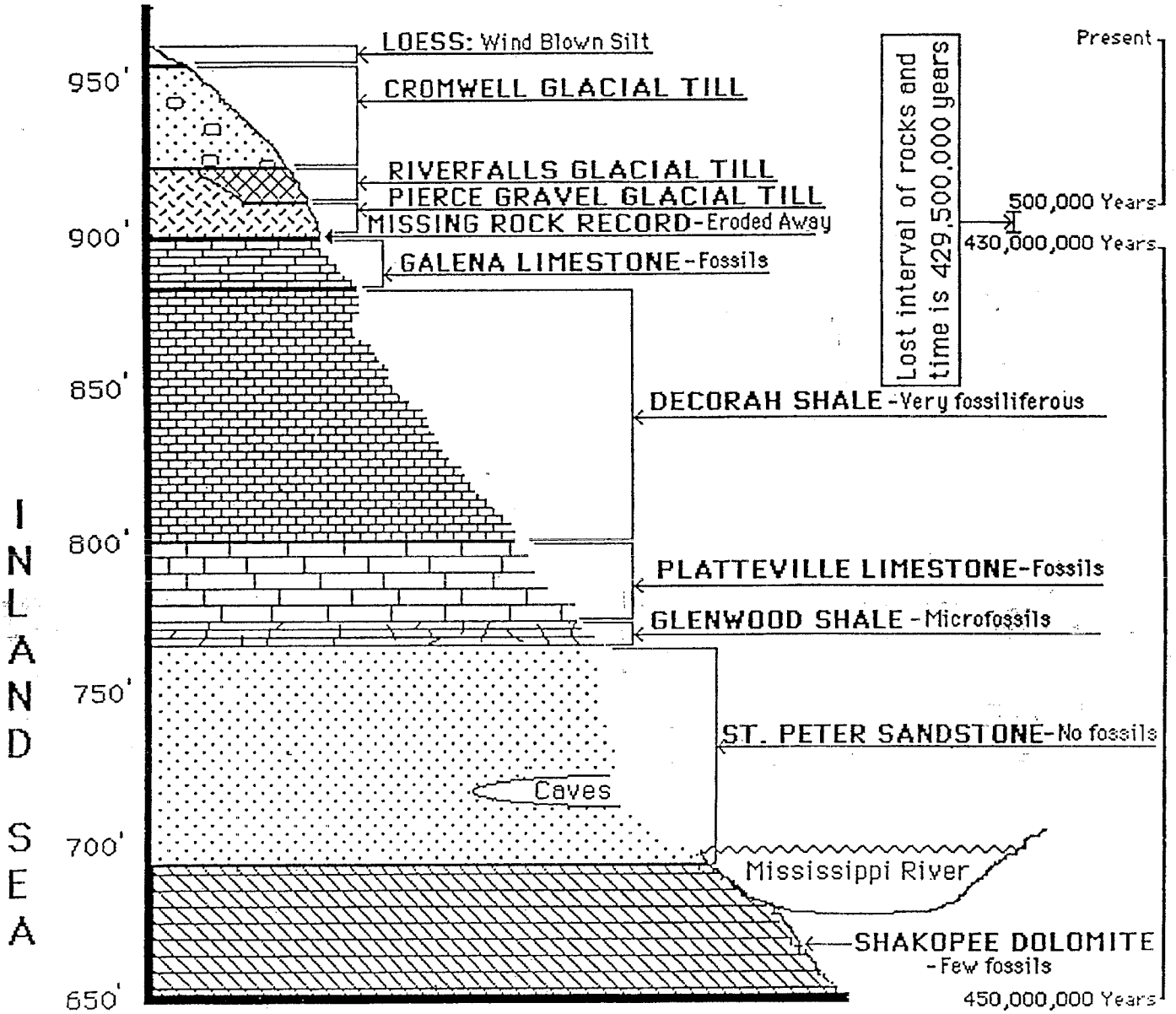
Rocks which are formed through sedimentation are arranged in an orderly progression with the oldest rocks below younger ones. At the Twin City Brick site, the oldest apparent rock is the sandstone at the bottom of the cliff (sandstone is beach sediment representing a near-shore environment), on top of this standstone is a 5-foot layer of shale (shale can be interpreted as a shallow off-shore environment), on top of this shale lies a 25-foot layer of limestone (limestone is made up of the mineral remains of deep ocean animal life), on top of this limestone is another 75-foot layer of shale (again, shale can be interpreted as a shallow off-shore environment). On top of this layer of shale is another 10-foot layer of limestone (again, limestone is made up of the mineral remains of deep ocean animal life). On top of these layers of sandstone, shale, and limestone is a 50-foot layer of glacial till.

Minnesota has a fine fossil record of invertebrates that extends back in time to the Cambrian and the Ordovician Periods, over 450 million years ago, and even some of the most primitive life forms (algae and bacteria) have been found in ancient Precambrian rocks. However, the most common fossils people find in Minnesota, are from the Cambrian and the Ordovician Periods.

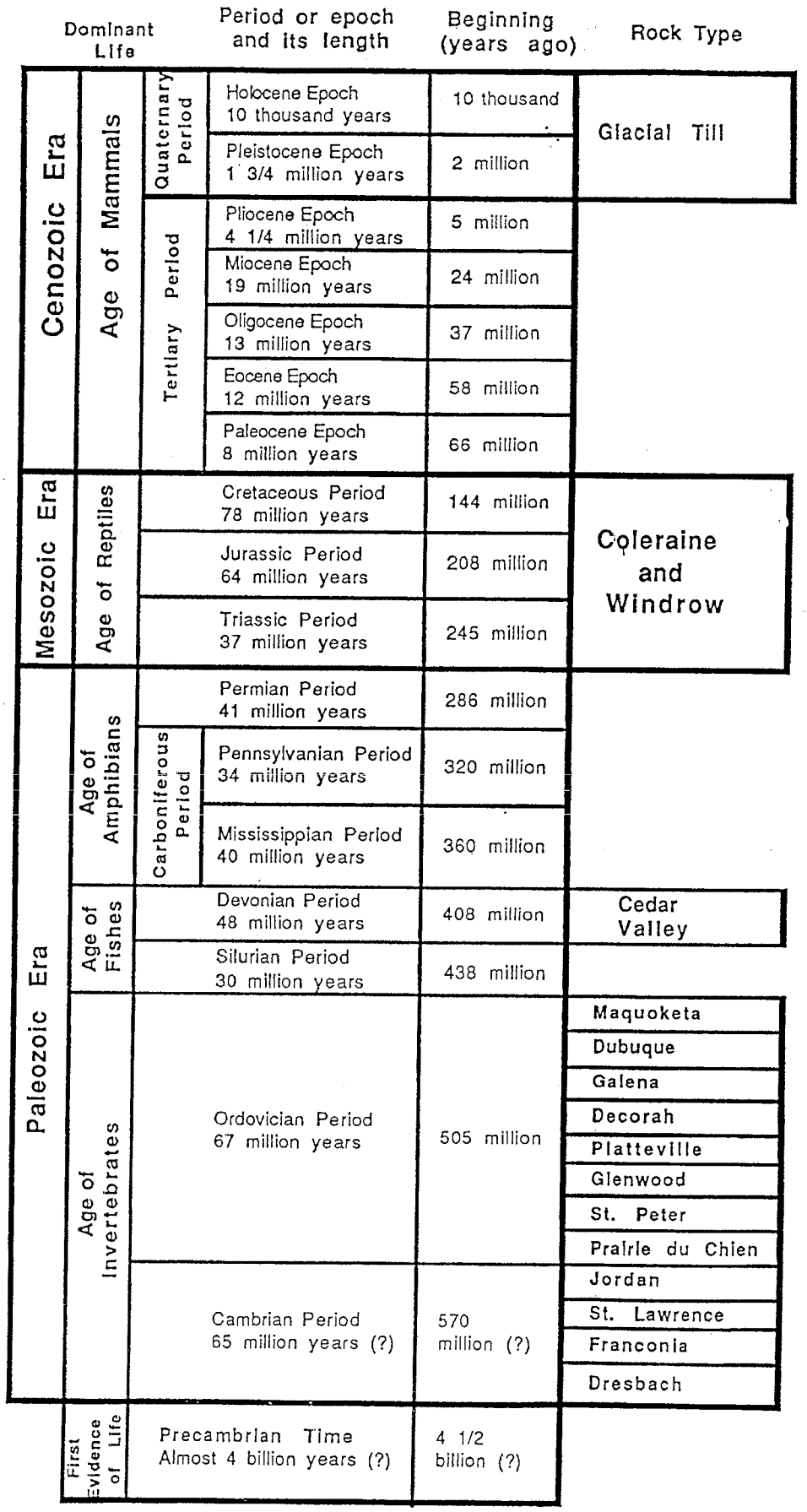
There is a large gap however, in Minnesota's history of life forms. Millions of years are unrecorded in Minnesota's rocks due to the glaciers that once traveled over Minnesota during the Ice Age, and left behind layers of glacial till. Fossils that had been buried in earlier ages in Minnesota were either pulverized or buried under ground-up rock as the ice sheet advanced and retreated. Pages of Minnesota's geologic history have been torn out and remain lost because of this.

Looking for fossils in Minnesota requires searching areas where building or road construction is underway or where river valleys have previously cut an opening into the land. This is the case in Lilydale, where the fossils are now exposed because of the excavation operations done due to the brick manufacturing that occurred here.

LILYDALE ROCK FORMATION



CROSS-SECTION TC GORGE AT LILYDALE (TC BRICK)


Dominant Life
Period or epoch and its length
Beginning (years ago)
Rock Type
Cenozoic Era
Age of Mammals
Quaternary Period
Holocene Epoch 10 thousand years
10 thousand
Pleistocene Epoch 1 3/4 million years
2 million
Glacial Till
Tertiary Period
Pliocene Epoch 4 1/4 million years
5 million
Miocene Epoch 19 million years
24 million
Oligocene Epoch 13 million years
37 million
Eocene Epoch 12 million years
58 million
Paleocene Epoch 8 million years
66 million
Mesozoic Era
Age of Reptiles
Cretaceous Period 78 million years
144 million
Jurassic Period 64 million years
208 million
Triassic Period 37 million years
245 million
Coleraine and Windrow
Paleozoic Era
Age of Amphibians
Permian Period 41 million years
286 million
Carboniferous Period
Pennsylvanian Period 34 million years
320 million
Mississippian Period 40 million years
360 million
Age of Fishes
Devonian Period 48 million years
408 million
Cedar Valley
Silurian Period 30 million years
438 million
Age of Invertebrates
Ordovician Period 67 million years
505 million
Maquoketa
Dubuque
Galena
Decorah
Platteville
Glenwood
St. Peter
Prairie du Chien
Cambrian Period 65 million years (?)
570 million (?)
Jordan
St. Lawrence
Franconia
Dresbach
First Evidence of Life
Precambrian Time Almost 4 billion years (?)
4 1/2 billion (?)

TYPES OF FOSSILS COMMONLY FOUND IN LILYDALE

Sponges or Burrow Fillings
This is a trace or indirect fossil, so named because the animal which made the burrow is not preserved. The creature was probably some kind of segmented worm, like the present day sand worm found on ocean beaches. (Illustration on Page 11)

Corals
Corals are simple animals which feed on floating microscopic sea life by capturing them on outstretched tentacles. They are are relatives of the jelly fish, and are usually colonial (several animals living together in a single house) but the most ancient ones were solitary (one animal per house). These fossils are often called solitary "Horn-Corals" because their house looks like a miniature horn. (Illustration on Page 11)

Bryozoa
Many people think that this fossil looks like a petrified plant. It is not; it is the skeleton of hundreds of microscopic colonial animals, called bryoza or "moss-animals". Once, they were very numerous in the oceans, now there are very few in todays oceans. They may be found in fresh water as well as salt water. Fossil bryozoa are represented by the preserved remains of their apartments; each tiny opening on the surface was the home of a single animal. They were filter feeders, straining out food particles from the water through special tentacles with sticky hairs on them. (Illustration on Page 11)

Brachiopoda
Brachiopods are like big-shelled bryozoa. They are solitary filter-feeders, suspending themselves above the sea bottom by a fleshy stalk. The opening for the stalk can usually be seen in the fossil. Brachiopods are also know as lamp-shells, because some kinds look like the ancient oil lamps used by the Greeks. Inside the shell are two coiled hairy tentacles which strain out food particles and pass it on to the mouth.
(Illustration on Page 11)

Pelecypoda
Clams, Snails and Cephalopods are members of a group of animals called Mollusks, which all have shells of varying size and shape. Because fossils are generally the preserved hard parts of ancient life, more is known about this group of animals than any other. Clams are unique among mollusks in that they are adapted to filter-feeding. Also, they have two halves to their shells like brachiopods, which they can open and close on a muscular hinge, unlike brachiopods, however, clams do not have a stalk. They use a muscular "foot" to move them around. Clams have gills, like fish, which they use for breathing and straining food. Fossil clams are usually casts of the internal form of the shell. They generally do not show the fine lines and ridges that are found on the shell of a brachiopod. (Illustration on Page 11)

Gastropoda
Snails are best identified by their coiled shells. They are adapted to several forms of feeding. Some are plant-feeders, some scavengers feeding on decaying animals and plants, and some are predators, feeding on living animals. Snails have a ribbon-like tongue called a radula; the radula has thousands of microscopic "teeth" which acts like a file to grind holes into shells or rasp off plant tissue.. Fossil snails probably fed on seaweed and shelled animals such as clams and brachiopods. (Illustration on Page 11)

Cephalopoda

The Cephalopod is a shelled squid/octopus like animal which has only one living relative - the Pearly Nautilus. The shell may be straight, curved, or coiled. It is made up of separate compartments stacked in a cone, which is pointed at one end, open and largest at the other, in which the animal lived. Cephalopods had well-developed eyes and tentacles for grasping food. They were mostly predators and able to swim by "jet-propulsion", forcing water out of a tube-like siphon. Except for the Nautilus, the group is extinct. Some forms had a shell over 13 feet long and a foot in diameter, making them the largest known form of Ordovician sea life. **(Illustration on Page 11)**

Trilobita

The Trilobite is a fossil which has fascinated people for a long time. They are extinct members of a group of animals called arthropods, because they have a jointed body like insects and crabs. Trilobites take their name from their three-lobed doby form. They dominated sea life during most of the early period of earth history. Because the animal is made up of a series of hard jointed plates, trilobites could roll up in a ball or lie flat. Most forms crawled on the sea bottom; some were able to burrow through it. Like the snails, trilobites developed a variety of feeding methods. Some ate seaweed, some were scavengers and some kinds were predators. They had compound eyes like insects and crabs, and were among the most highly evolved forms of Ordovician sea life. **(Illustration on Page 11)**

Crinoids

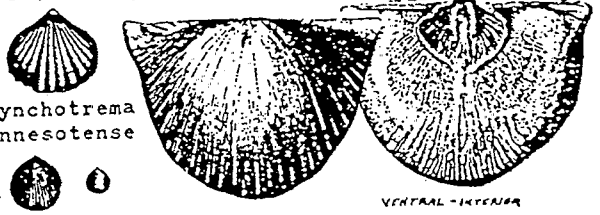
Crinoids are relatives of starfish, sand dollars and sea urchins. They are Echinoderms or spiney-skinned animals with a body-form of 5 rays. The Sea Lily is a living member of the group. Most crinoids resemble a flower with a long stem and radiating arms or petals. They are covered by hard plates; there may be several thousand to a single animal. The arms have smaller "little arms" called pinnules (resembling a feather) which catch food particles; filtering them from the water. Food is carried down the 5 arms in a food groove to the mouth, which is at the center of the "flower". Crinoid fragments are very common as fossils, but complete ones are very rare. This is because the chance for breaking up the thousands of plates are far greater than keeping them together. Usually, crinoids are the most valued of fossils. **(No Illustration)**

Graptolites

Graptolites are curious fossils. They are totally extinct forms of life, and have been an anomaly for scientists for many years. The most accepted theory is that graptolites are very primitive ancestors of all vertebrates (animals with backbones, including man). They are colonial, living in chambers on long strands which are suspended from gas-filled floats. The fossil resembles fine black saw-blades. The black color is carbon film giving the animal its name, graptolite or "to write on rock". They look like pencil marks on limestone. **(Illustration on Page 12)**

Minnesota Ordovician Fossils
of the Twin City area

BRACHIOPODS



Rhynchotrema minnesotense

Zygospira recurvirostris

Strophomena incurvata

BRACHIOPODA

Hesperorthis tricenaria

Pionodema subaequata

Lingula elderi

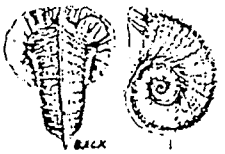
GASTROPODA

Clathrospira subconica

Trochonema umbilicatum

Lophospira oweni

Ophiletina angularis

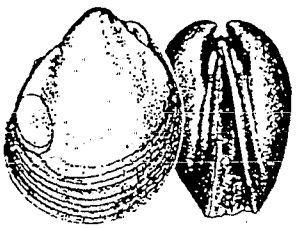


Phragmolites fimbriatus

Sinuites pervoluta

Cyrtolites retrorsus

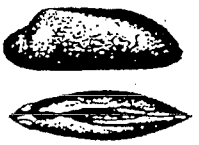
PELECYPODA



Vanuxemia obstusifrons

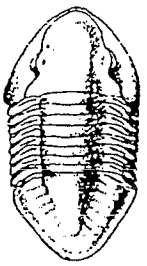
Modiolopsis plana

Ctenodonta nitida



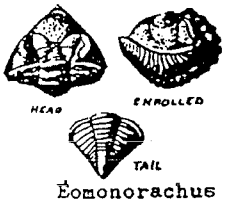
Orthodesma minnesotense

TRILOBITA



Isotelus gigas

Bumastus trentonensis



Eomonorachus intermedius

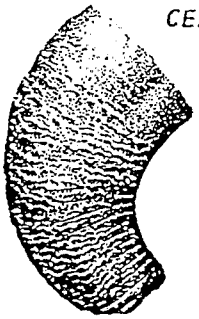
BRYOZOA

Stictoporella cribosa

Rhinidictya mutabilis

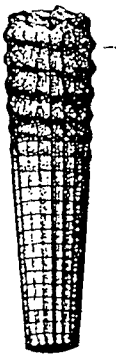
Batostoma minnesotense

CEPHALOPODA

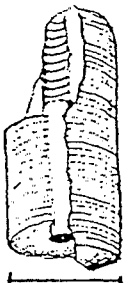


Zitteloceras clarkeanum

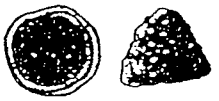
Nanno aulema



Spyroceras bilineatum



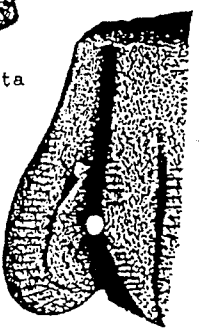
Endoceras proteiforme



Prasopora conoidea

Hallopora multitabulata

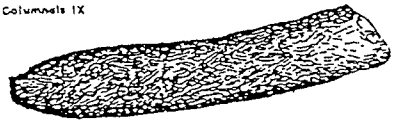
SPONGES ?
or BURROW FILLINGS



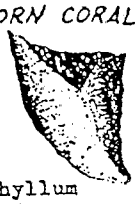
Rauffella palmipes

DON WALLACE

Rauffella filosa



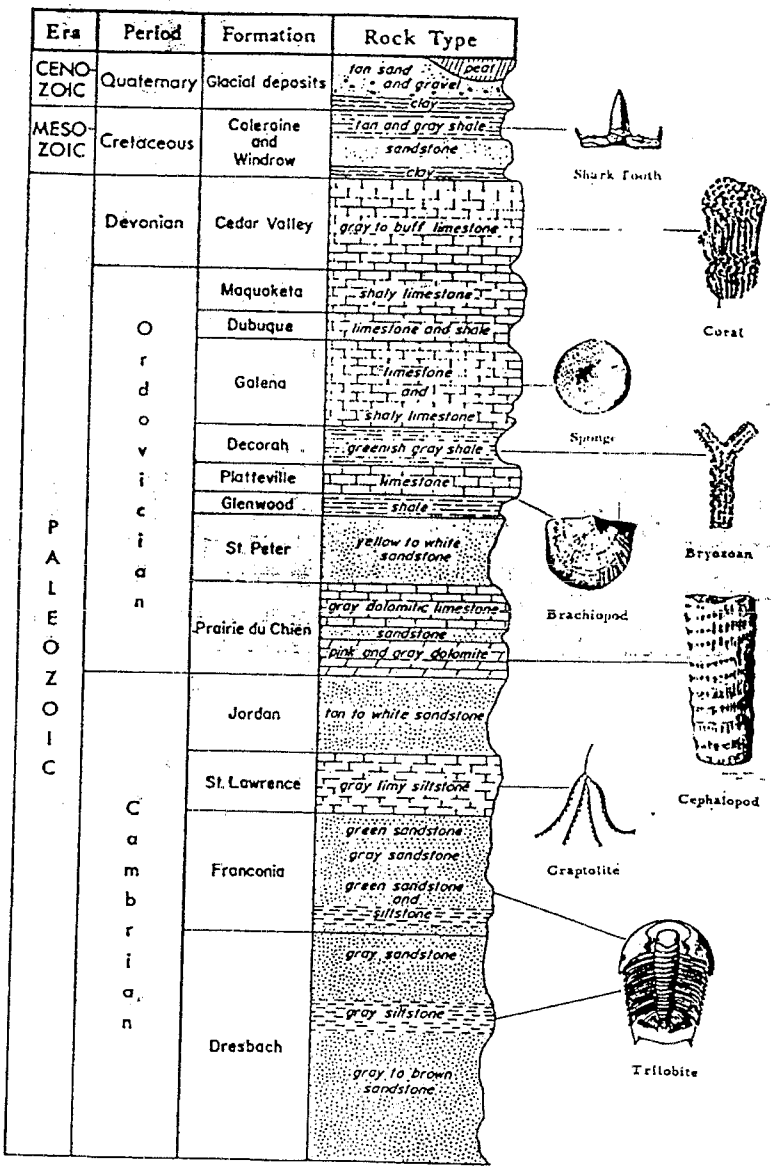
HORN CORAL



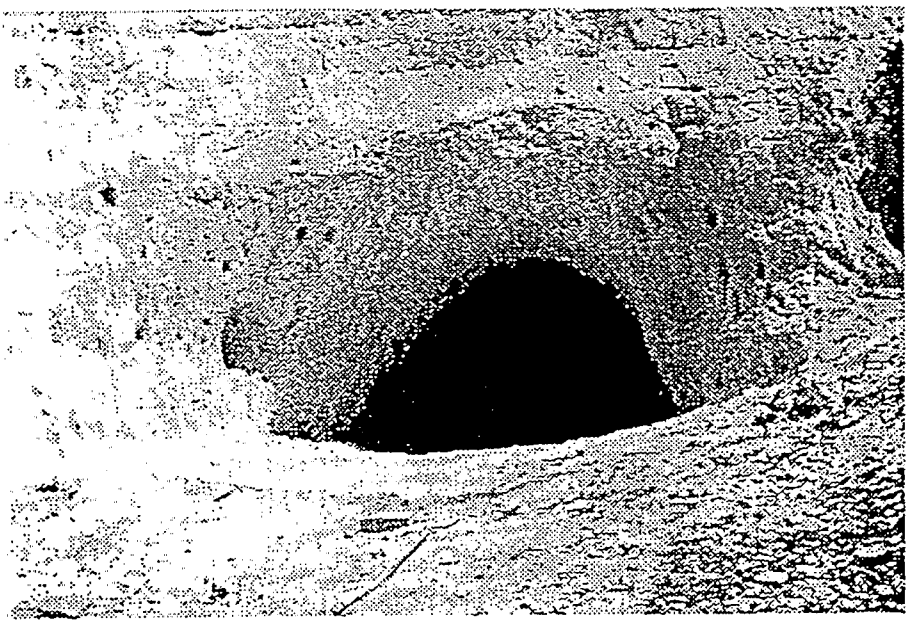
Lambeophyllum profundum

Aulopora trentonensis

Fossiliferous Rock Units_Minnesota



ECHO CAVE



Most caves (they really should be referred to as mines, as they are all man made) in the Twin Cities Area occur in the St. Peter Sandstone Formation (see page 7). The soft white sandstone is very pure, and contains very little impurities or cementing agents; which makes mining comparatively simple.

During the early 1900's, several breweries were located in the bottom land area of the river gorge. The demand for glass bottles was satisfied by mining out the exposed sandstone along the walls of the gorge, and heating the sand to form glass; these old mines are today's caves. They were hand dug, from the top down, as can be seen by the upper shelf at the end of most shafts.

As the beer industry waned, many of the caves were transferred to the task of mushroom growing. The caves provided an ideal habitat for this purpose. First, the caves provided uniform growing conditions with a constant humidity of 90% and a yearly temperature range of only 52 to 54 degrees. Secondly, the lack of light enabled the non-green crop to flourish. All that is required is a suitable growing medium, such as a decomposing mulch. At Faribault, Minnesota, caves dug in the same formation are providing the environment for cheese making. These caves also began with the beer industry. Now abandoned and potentially hazardous, all of the caves in Saint Paul are closed to the public for your protection.

Echo Cave is just one of many man-made caves previously used for business or storage purposes. The cave came about from a need for sand to use in the manufacture of bricks, the resulting man-made cavern was used for the storage of bricks manufactured here at the Twin Cities Brick Quarry. Although Echo cave lacks the sparkle of drip stone features such as stalactites or stalagmites, it is fascinating in its own way. It has a cultural history, and provides an insight into the geology of the area.

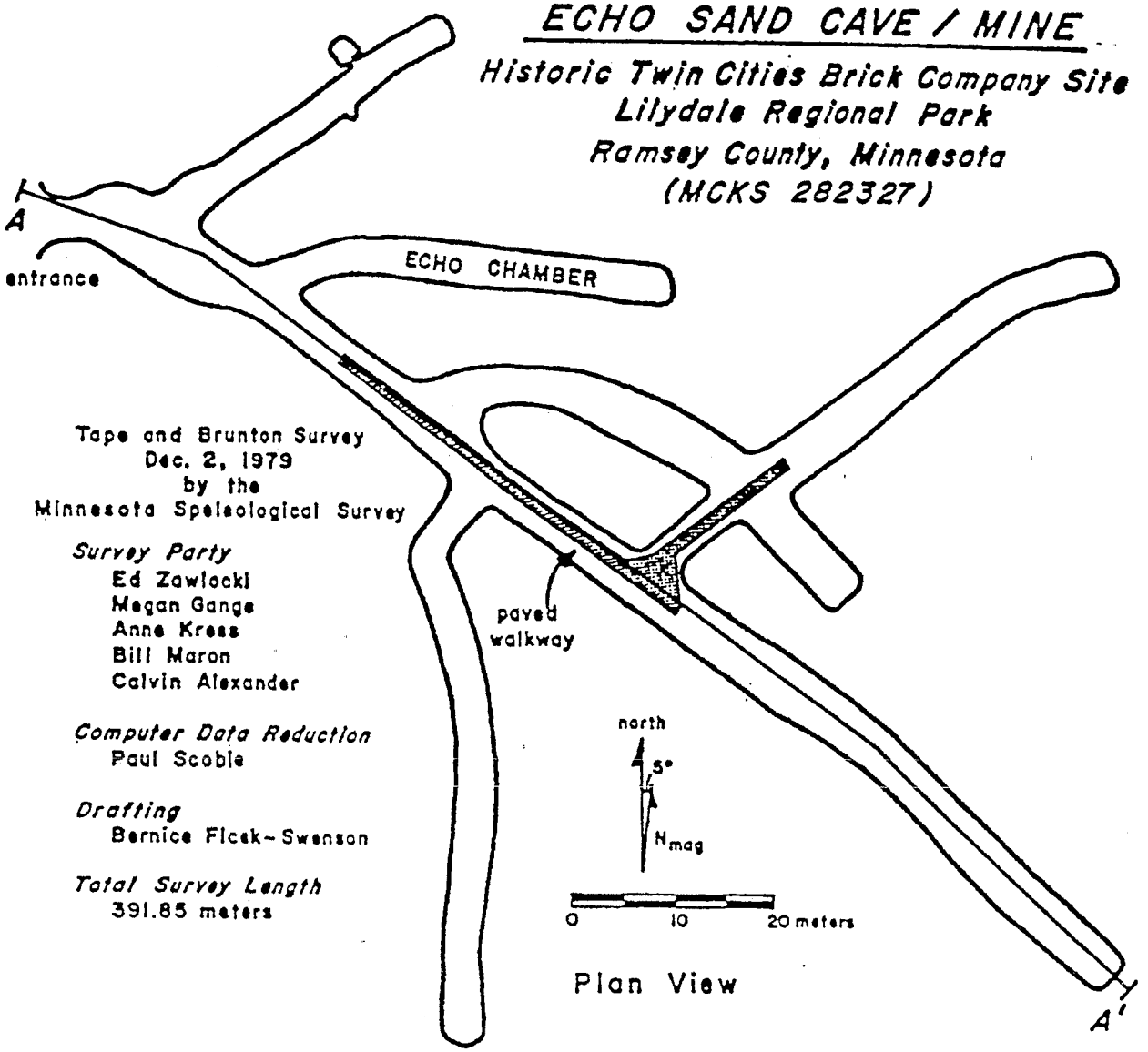
In the 1950"s , Dr. James R. Beer discovered that Big Brown bats (*Eptesicus fucus*) used these caves as hibernacula (winter living quarters). Bats avoid the rigors of winter by becoming dormant - sleeping away the season in the relatively warm, dark, quiet recesses of the caves. When dormant, bats are helpless and they are easily disturbed by the presence of people. Such disturbance may cause their death. The "bat" gate at Echo Cave has been erected to protect the bats in their hibernaculum. It is for this reason that this cave is closed to unauthorized human visitors.

For more information on bats or to report damage to the gate – Contact either the:

City of Saint Paul – Division of Parks and Recreation
Phone: 651-632-5111 Fax: 651-632-5115
Minnesota Department of Natural Resources Nongame Wildlife Program
Phone: 651-297-4966

ECHO SAND CAVE / MINE

Historic Twin Cities Brick Company Site
Lilydale Regional Park
Ramsey County, Minnesota
(MCKS 282327)



Plan View

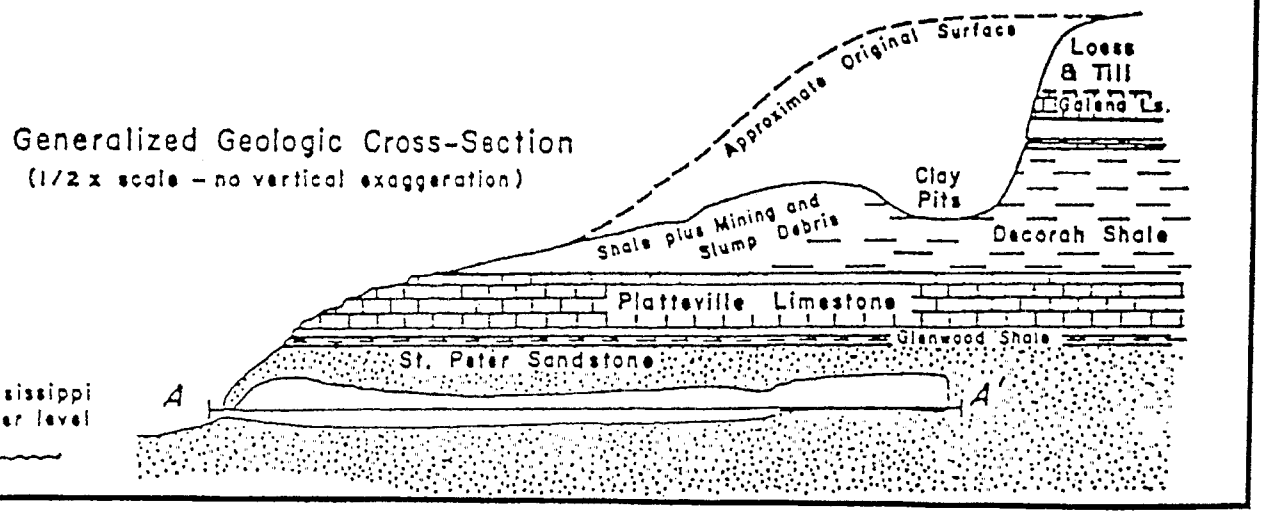
Tape and Brunton Survey
Dec. 2, 1979
by the
Minnesota Speleological Survey

Survey Party
Ed Zawlocki
Megan Gange
Anne Kress
Bill Maron
Calvin Alexander

Computer Data Reduction
Paul Scoble

Drafting
Bernice Ficek-Swenson

Total Survey Length
391.85 meters



Generalized Geologic Cross-Section
(1/2 x scale – no vertical exaggeration)

A FASCINATION WITH BATS

Introduction

Bats belong to an order of mammals called the Chiroptera or "hand-winged". They are the only mammals capable of true flight. Others with the name "flying..." are really gliders, incapable of sustained flight. Bats are beneficial to people worldwide by eating insects, pollinating fruits and distributing seeds in their droppings. They live in trees, using the flaps of skin between their legs as an air foil to extend their jumps or escape a predator. The development of flight has occurred in two separate groups of vertebrates: the birds and the bats. The freedom of flight creates a aura of mystery, which is part of mans' fascination with bats.

Natural History

Bats evolved in the last geologic period, the Cenozoic Era or Age of Mammals. They developed early from primitive shrew-like insect-eating animals during the latter part of the Paleocene Epoch, over 50 million years ago. During the lower Eocene Epoch, just 10 million years later, bat ancestors took to the air. In fact, the oldest bat fossil, Paleochiropteryx, had well-developed webbed wings; differing from modern bats only in the two-clawed fingers as opposed to the one-clawed finger on each front wing of present day bats.

Life Studies

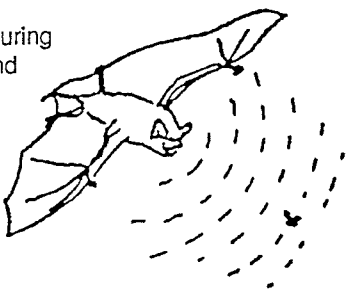
Minnesota has seven species of bats. All are relatively small insect-feeders. They are placed into two general categories: **cave bats**, which typically roost together in groups in caves, abandoned mines, or buildings; and **tree bats** which commonly roost alone or in family groups of a mother with (1 to 4) young, in trees or shrubs.

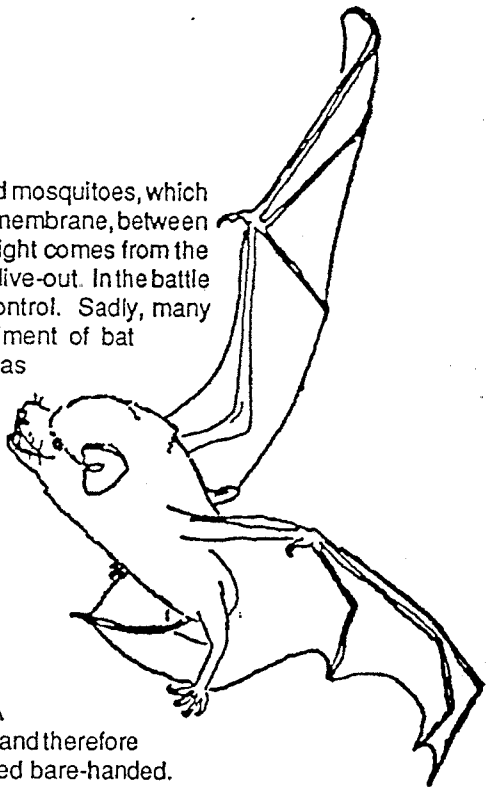
The two most common varieties of local bats are the **Little Brown Myotis** and the **Big Brown Bat**. Both are cave bats which spend the summer nights out of doors, catching flying insects, and returning to their favorite roost each day. The roost may be cave, crevice, the eave of a building or occasionally an attic. Often these congregations of bats are nursery colonies of pregnant females or mother bats with their young. The young, usually one per female, are born in May or June, when insect populations are at their peak. When the mothers emerge in the evening to feed, the young are left behind, where they usually form clusters. Mothers return at intervals throughout the night to nurse their babies. Young bats first fly at about 3 weeks and are weaned soon after.

Bats mate in fall and winter, and the female of most species retains live sperm in her body until spring, when she becomes pregnant. Fall is also the time when bats move on to their winter quarters. The three species of tree dwelling bats in Minnesota - the **Hoary bat, Red bat,** and **Silver-haired bat** - fly south to hibernate in milder climates. The other, more winter hardy species, remain to hibernate in caves, mine tunnels, storm drains, and other moist, quiet retreats. Occasionally, a big brown bat may over-winter in a house, basement or outbuilding. Hibernation extends from early November to late April.

Special Adaptations

Food gathering senses in bats are highly adapted to locating and capturing night-flying prey. In particular, bats' rely on very sensitive hearing and touch. The bat method is called "ecolocation", wherein they emit high frequency sound bursts or "clicks" which bounce-off an object, producing echoes. This is heard by the bats sensitive ears and provides distance and direction. It may even echo hard or soft, telling the bat something of the nature of the object. The effectiveness of this system can be appreciated when one realizes that some species of bats can catch up to 600 mosquitoes in an hour.





Methods Of Feeding

Bats eat an enormous amount of insects, especially flies and mosquitoes, which they catch in flight. They use their mouth, wings, or the hind-membrane, between legs and tail, as a catcher's mitt. Their apparent "erratic" flight comes from the habit of feeding in mid-air; causing them to tumble-over and dive-out. In the battle to control mosquitoes, bats are our strongest biological control. Sadly, many chemical insect control efforts have worked to the detriment of bat populations; reducing them in number and effectiveness as natural predators.

Behavior As Pets

Because bats consume enormous amounts of food and hibernate in the winter, they do not make satisfactory "pets". Further, the occasional incidence of rabies in bats makes handling them unwise (except to only the most experienced bat scientists). Recognizing "normal behavior" is critical in avoiding sick bats. A bat grounded in the day time should be considered abnormal and therefore avoided. In no case should a sick or downed bat be handled bare-handed.

Bats In Buildings

In a few instances, a colony of bats may become a problem if it roosts in a building. When bats must be evicted, the only safe, permanent solution is to build them out by sealing roost entrances after the bats' nightly or seasonal departure. In Minnesota, wait until after July when young are flying and will not be trapped inside where, separated from their mothers, they would die of starvation, and unnecessary cruelty. Windows, doors, vents, and chimneys should be screened and draft guards placed under attic doors to keep bats and other wildlife out of human living quarters.

Poisoning bats is ill-advised. There are no chemicals licensed for bat control in Minnesota. Pesticides used against bats are illegal, costly, ineffective, and potentially hazardous both to man and the environment. Their use serves to increase, rather than decrease public health risks by exposing people, pets, and other wildlife to sick or dead bats.

A peaceful coexistence with bats may be advantageous. Many people who have bat colonies claim to have fewer mosquito problems around their homes and enjoy watching their bats hunt for insects.

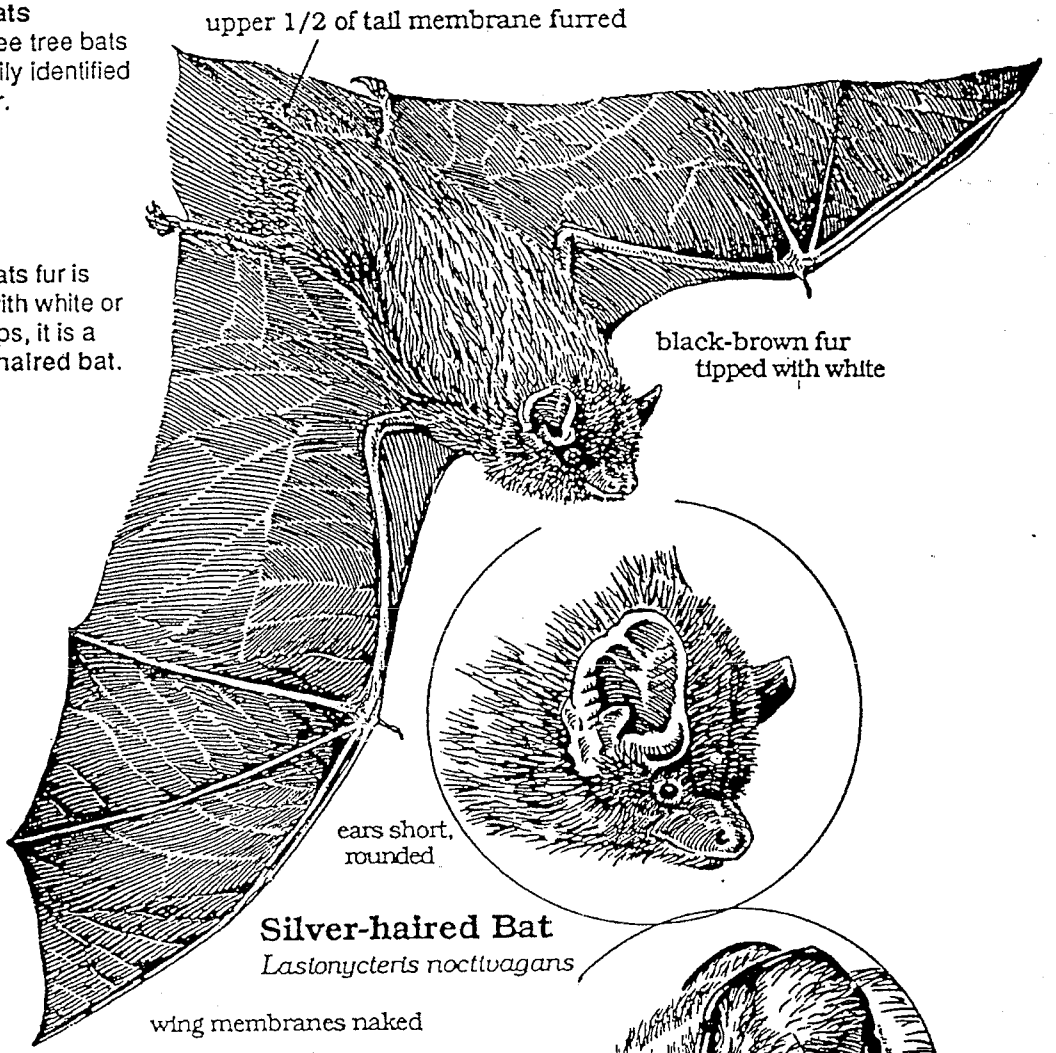
by Michael Ryan, Environmental Education Coordinator Minneapolis Park and Recreation Board.
Revised by the Minnesota Department of Natural Resources, Nongame Wildlife Program, 1989.

BAT IDENTIFICATION

The seven common bats of our area may be identified by size, shape of ear, amount of fur in the tail region and to some extent, by color.

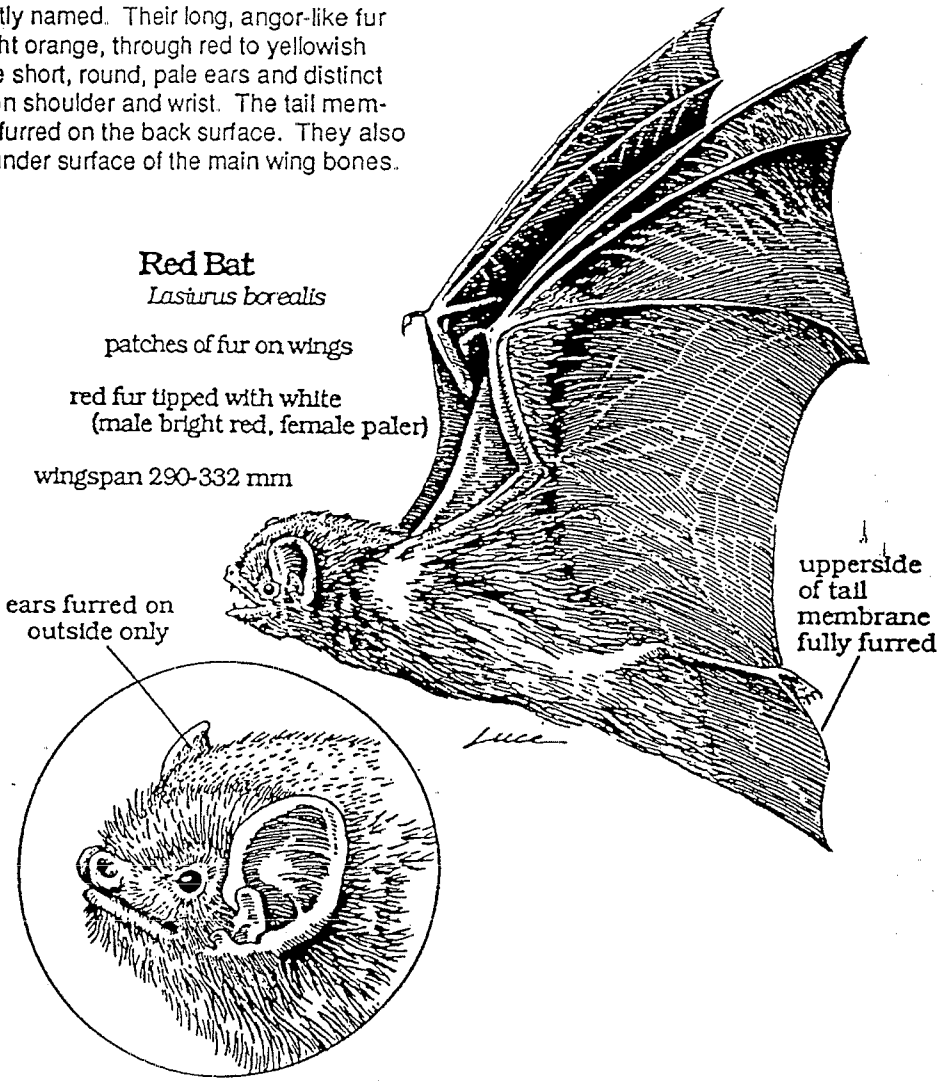
Tree Bats
The three tree bats are easily identified by color.

If the bats fur is black with white or silver tips, it is a Silver-haired bat.



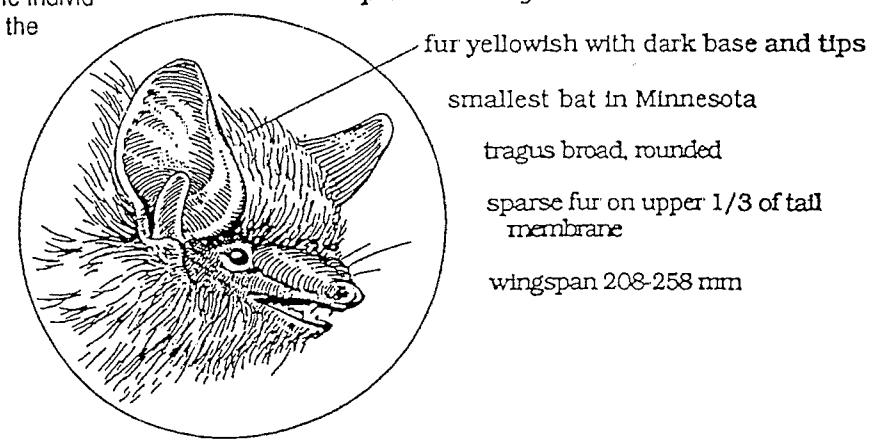
The extra fur on tail and wing bones are characteristics shared by the Hoary bat, which has darkly colored (not red) fur. The tips of many hairs are white giving the bat a frosty or "hoary" appearance. Hoary bats have conspicuous white wrist marks, rounded ears edged in black, and a unique yellowish or orangish throat collar. They are the largest bats in Minnesota with a wingspan of 16 inches.

Red bats are aptly named. Their long, angor-like fur ranges from bright orange, through red to yellowish brown. they have short, round, pale ears and distinct white markings on shoulder and wrist. The tail membrane is entirely furred on the back surface. They also have fur on the under surface of the main wing bones.

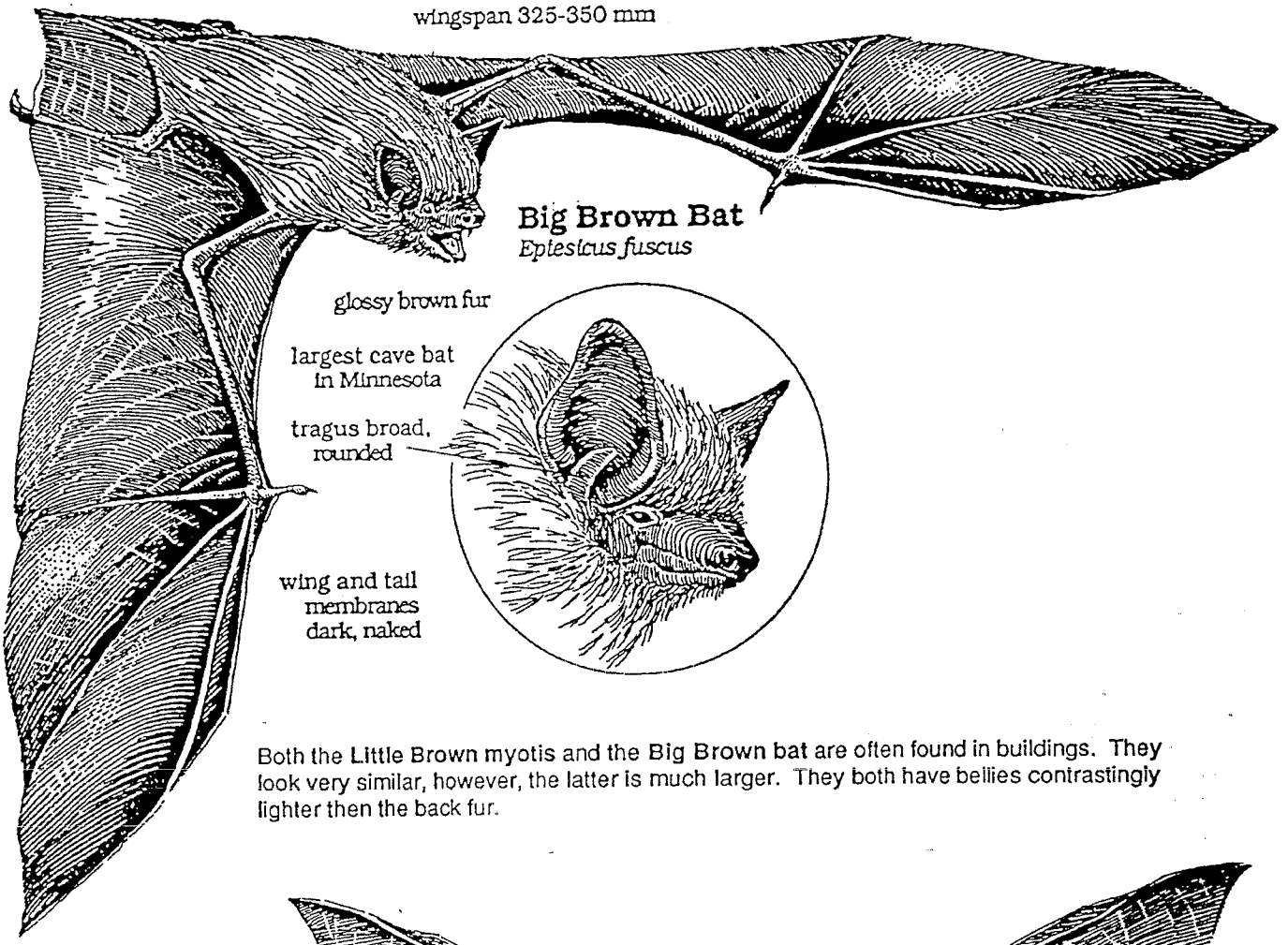


Cave Bats
The four species of cave bats are all similarly brown in color and difficult to differentiate.

The **Eastern Pipistrelle** is the smallest and has a dark belly, The back fur is tricolored. When the fur is parted, the individual hairs appear black at the base, followed by a wide band of light yellowish brown, and tipped with a contrasting light color.



wingspan 325-350 mm



Big Brown Bat
Eptesicus fuscus

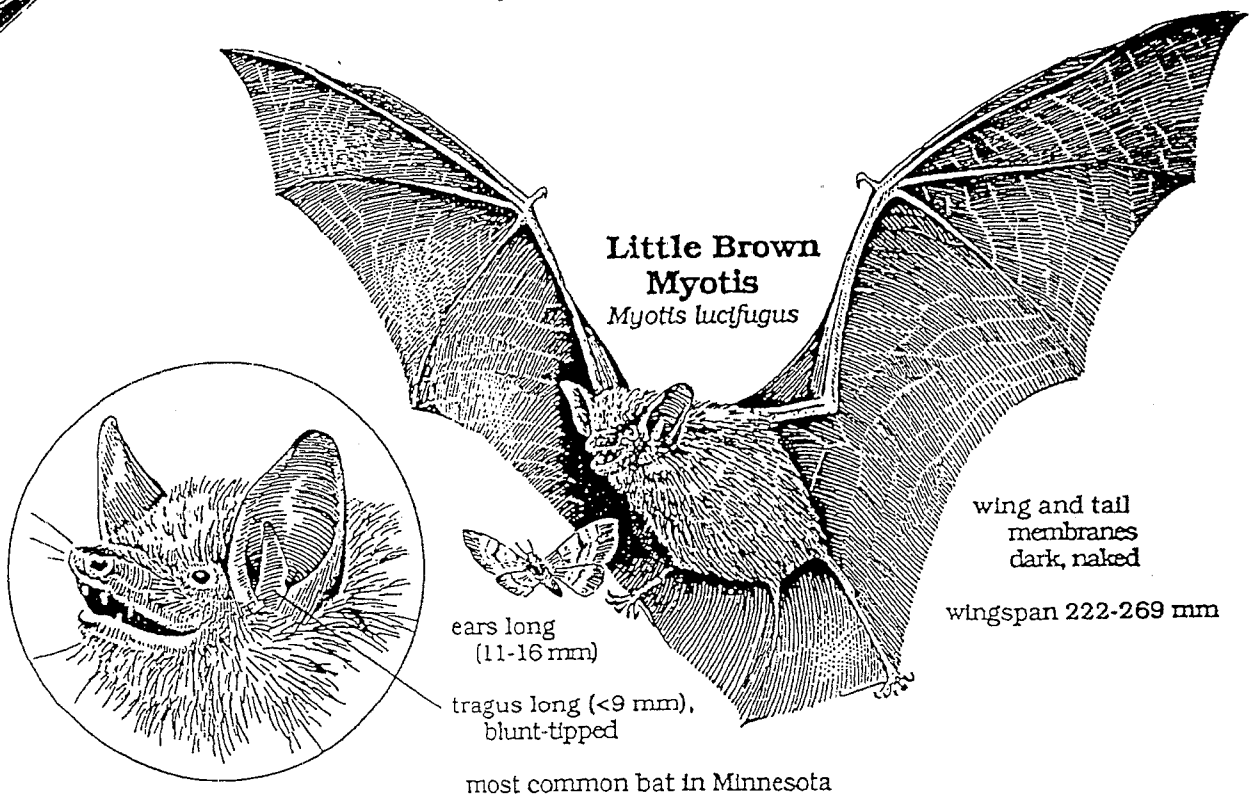
glossy brown fur

largest cave bat in Minnesota

tragus broad, rounded

wing and tail membranes dark, naked

Both the Little Brown myotis and the Big Brown bat are often found in buildings. They look very similar, however, the latter is much larger. They both have bellies contrastingly lighter then the back fur.



Little Brown Myotis
Myotis lucifugus

wing and tail membranes dark, naked

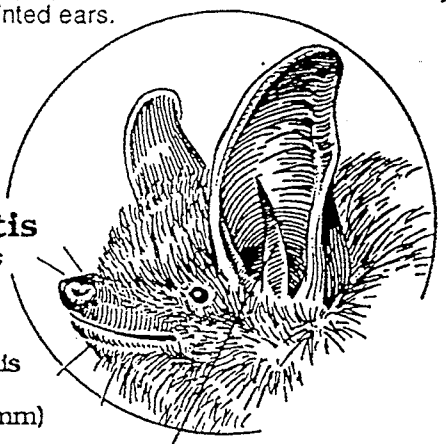
wingspan 222-269 mm

ears long (11-16 mm)

tragus long (<9 mm), blunt-tipped

most common bat in Minnesota

The **Northern Myotis** belly fur also is contrastingly lighter then the back fur, it also closely resembles the **Little Brown Myotis** except for longer, more pointed ears.



Northern Myotis
Myotis septentrionalis

closely resembles
little brown myotis

ears longer (14-19 mm)

tragus longer (>10 mm) pointed,
and narrow

wingspan 270-310 mm

Bats in Minnesota

The bat drawings in this brocure are from:

James Ford Bell
Museum of Natural History
University of Minnesota

KEY TO THE BATS OF MINNESOTA

A.	1.	Fur black with white tips	Silver-haired bat, *Lasionycteris noctivagans*
	2.	Fur not black	Go to B
B.	1.	Interfemoral membrane and dorsal surface of tail furred	
		a. Fur red, rounded ears pale in color	Red bat, *Lariuris borealis*
		b. Fur not red, rounded ears edged in black, fur a mixture of yellowish-dark brown and white colors.	Hoary bat, *Lariuris cinerius*
	2.	Inter-femoral membrane and dorsal surface of tail not furred	
		a. Fur tri-colored on back (blow on fur and dark belly)	Eastern pipistrelle, *Pipistrellus subflavius*
		b. Belly light	Go to C
C.	1.	Forearm greater then 45 mm	Big brown bat, *Eptesicus fuscus*
	2.	Forearm less then 45 mm	
		a. ears large, tragus pointed	Northern myotis, *Myotis septentrionalis*
		b. other	Little brown bat, *Myotis lucifugus*